Community Affairs File

State Parks (Ind)

1979

State Park Guide 8

GEOLOGIC STORY OF DUNES STATE PARK

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STATE OF INDIANA
DEPARTMENT OF NATURAL RESOURCES
GEOLOGICAL SURVEY
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INTRODUCTION

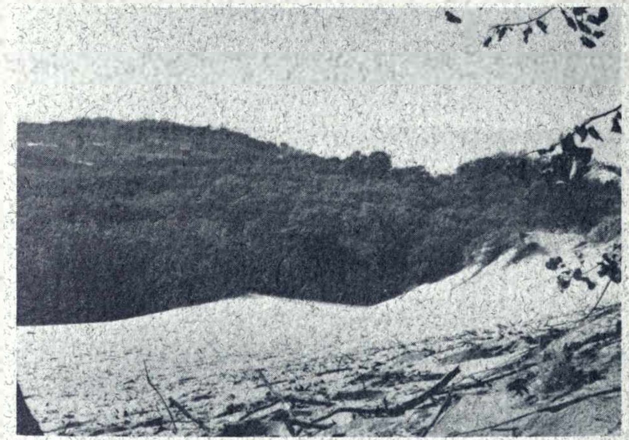
The Indiana Dunes State Park is in a unique geologic setting at the southern tip of one of America's largest freshwater lakes. A product of waning glacial ice, Lake Michigan is the last significant contribution of the great Ice Age to northwestern Indiana. Today park visitors enjoy expansive sand beaches and rolling dunes—features that beautifully illustrate the effects of wind and water in reshaping the surface of the land since the departure of the glacier from this region some 12,000 years ago.

The beach—an endless supply of sand for the ever-changing dunes

LAKE MICHIGAN IS BORN

As ice of the last major glaciation of North America retreated northward in response to a worldwide warming trend, enormous volumes of meltwater were released. Part of this deluge was impounded by an arcuate ridge of glacial deposits called the Valparaiso Moraine (named for Valparaiso in Porter County, Ind.) that circumscribed approximately the southern quarter of the Lake Michigan basin. Trapped between the melting ice lobe and the moraine, the newly formed lake marked the birth of what became Lake Michigan. As the ice continued to recede (punctuated by at least two minor readvances into northwestern Indiana), more and more of the ice-locked basin was exposed and filled with meltwater. Simultaneously, the Valparaiso Moraine was breached, which formed drainage outlets to the south and southwest. This resulted in a gradual lowering of lake level. A complex history of ice-front fluctuations within the lake basin, together with variations in discharge through the outlets, created a series of different lake levels, each with its corresponding beach and dune complex.

Evidence for only three of the numerous lake levels and their corresponding beaches is recognized in the area including the Dunes State Park. The lake levels are called, from oldest to youngest: the Glenwood Beach and level at 640 feet above sea level, the Calumet Beach and level at 620 feet, and the Toleston Beach and level at 605 feet. Modern-day Lake Michigan is about 580 feet above sea level and has probably occupied nearly that elevation for the past 1,500 to 2,000 years. Most of the Dunes State Park is restricted to the Toleston and Recent beaches, although the southern boundary of the state property includes a small part of the Calumet Beach and its dune relics.

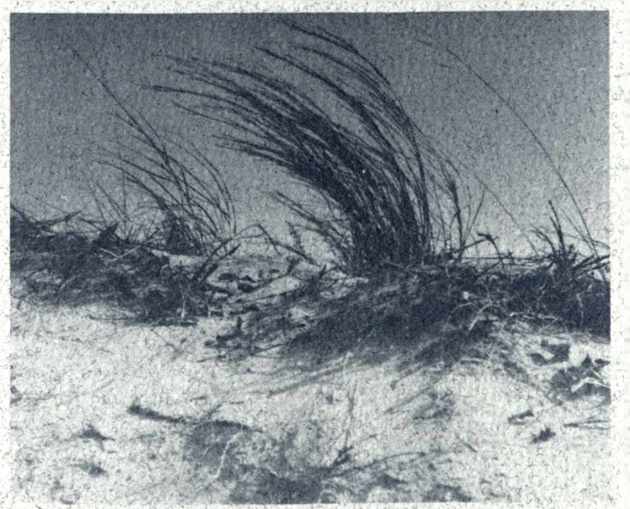

Looking west from the summit of Mt. Tom

MOUNTAINS OF SAND

Sediments left behind by the melting glacier were sorted and transported by streams flowing into the newly formed lake as well as by the action of currents and waves of the lake itself. The heavier materials, such as sand and gravel, settled in the nearshore region while the fine particles of clay and silt remained in suspension until they reached the deep, quiet waters of the open lake, where they settled to form dense bottom muds. Transported by longshore currents, which move in a southerly direction along the eastern and western shores and meet at the south end of the lake, the sand was then washed ashore by low rolling waves. Once on the open beach, winds blowing off the lake whisked the sand inland, which formed sinuous ridges known as foredunes. The same processes of sediment transport are, of course, still active today and account for the ever-changing character of the modern beach and foredune.

A WOODY WALL OF DEFENSE

Sand dunes are usually thought of as transient features whose form and position are constantly changing. Yet when vegetation takes hold, they can become reasonably stable landforms as illustrated by the persistence of dunes formed thousands of years ago. Vegetative control begins with the invasion of fast-growing grasses, huckleberry, wintergreen, goldenrod, and other ground cover. Once the sand becomes relatively stable, species of willow, grape, and cherry soon appear and are followed by jack pine, aspen, and finally oak. The wind-shelter effect of the trees and undergrowth, together with the holding power of their root systems, anchors the sand and results in the dune types that are common in this area.


Rapidly growing grasses and other ground cover help to stabilize the dunes

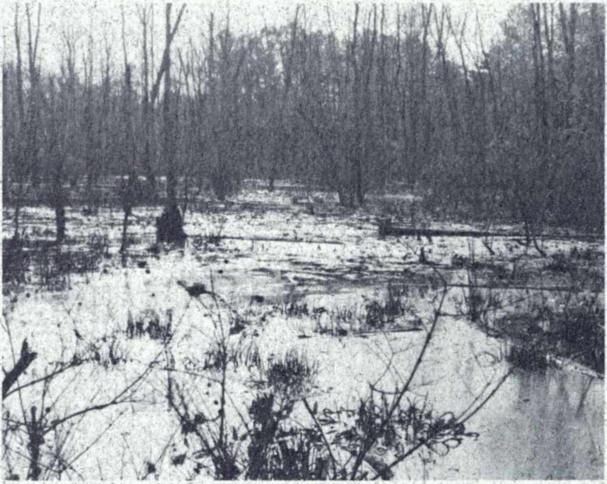
BLOWOUTS AND MIGRATING DUNES

Blowouts usually begin as a narrow channel on the crest of the foredune where vegetation has been removed by either man or nature. This confined breech acts to accelerate wind velocities greatly and results in intense erosion immediately behind the opening. The sand from this excavation is piled high atop the lee slope of the steep-walled depression, which creates an amphitheater-like topography. Both Mt. Tom and Mt. Holden, towering nearly 200 feet above the beach, are examples of highly developed blowouts. Beach House, Furnessville, and Big Blowouts (trails 9 and 10) are also typical of this type of dune. Long-buried trees, sometimes exhumed during blowout development, reveal evidence of older forest cover that had succumbed to a rapid growth of the foredune at some time between the Toleston and Recent lake levels. The tree graveyard exposed at Big Blowout (trail 10) was once a living forest that probably grew on the foredunes during Toleston time.

Migrating dunes, which are closely related to blowouts, form when sand supply suddenly increases

Big Blowout at the east end of the park

because of excessive wind erosion, an increase in beach width, or the sudden removal of vegetative cover. Moving in the direction of the prevailing wind, migrating dunes can engulf entire forests. They stabilize as sand supplies diminish and vegetative control is reestablished.

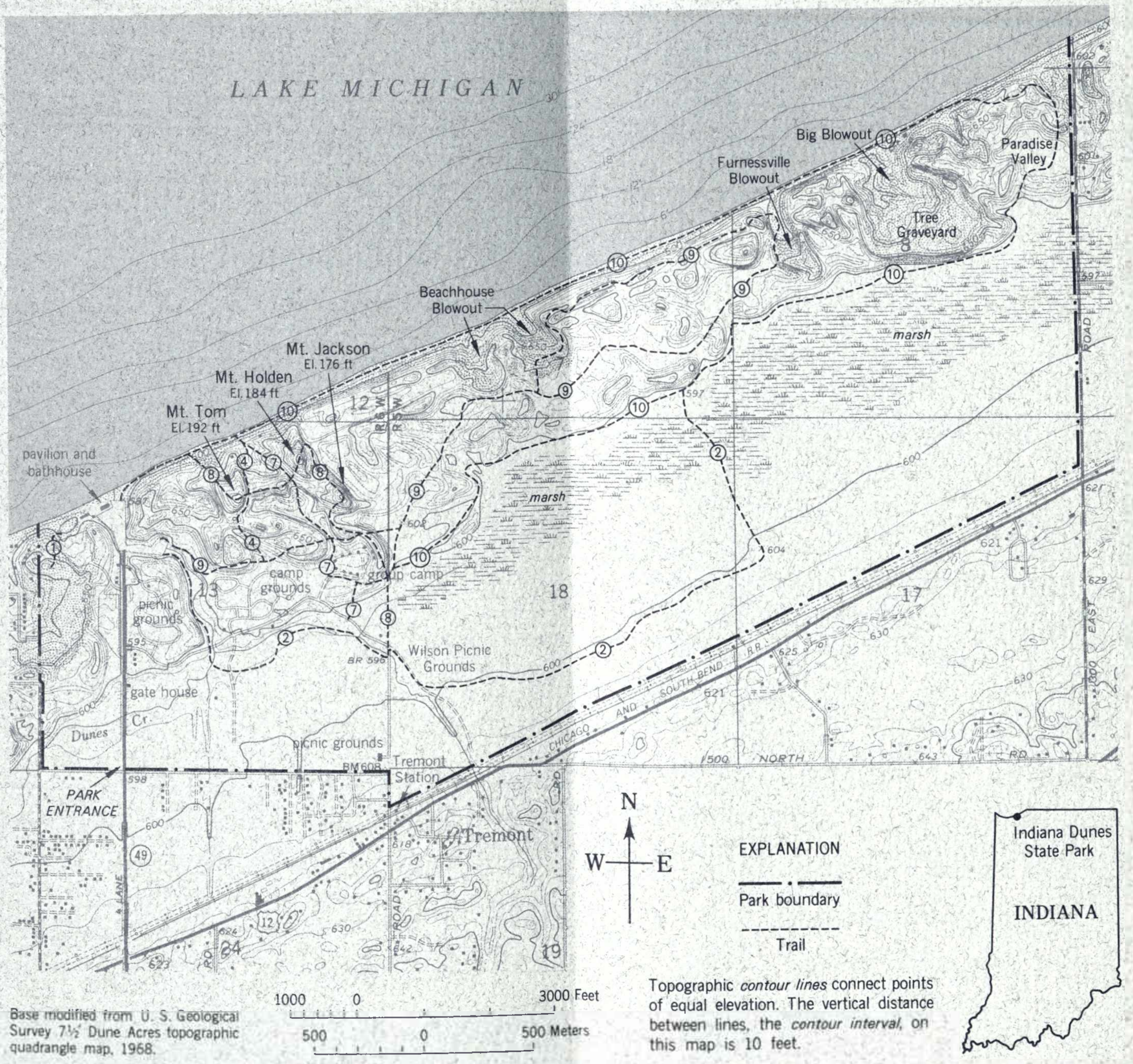


The interdunal marsh as viewed from the bridge on trail 8 near the Wilson Picnic Grounds

THE INTERDUNAL MARSH

Between the recent and relict foredunes of the earlier lake stages is a flat-lying marsh bordered by numerous secondary dunes that formed in recent time. The marsh is maintained by a high water table that remains at or near lake level. Deflation of the interdunal area by wind erosion is restricted to the elevation of the water table, which accounts for the broad, flat expanse of the marsh. Dune encroachment into the swamp, however, is common and is the reason for the lack of mature plant communities in this area. Trails 8 and 10 offer good views of the marsh in contrast with the densely wooded dunes around it.

Glacial Geologist John R. Hill
Photography – George R. Ringer



Base modified from U. S. Geological Survey 7½′ Dune Acres topographic quadrangle map, 1968.

Topographic *contour lines* connect points of equal elevation. The vertical distance between lines, the *contour interval*, on this map is 10 feet.

TOPOGRAPHIC MAP OF INDIANA DUNES STATE PARK, PORTER COUNTY, INDIANA

Ind. Dunes
Ind. State Parks
PAMPHLET FILE

INDIANA'S DUNES

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Indiana's Unrivaled Sand-Dunes

A National Park Opportunity

By

ORPHEUS MOYER SCHANTZ

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GARY, INDIANA

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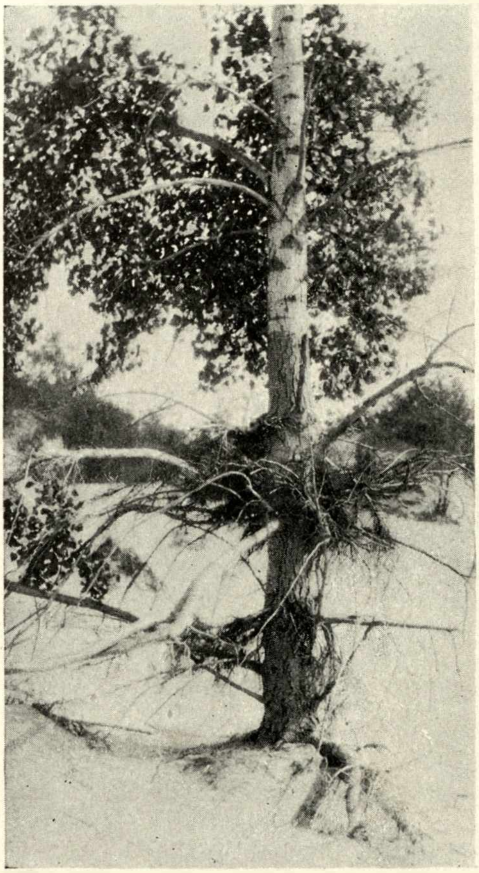
INDIANA'S UNRIVALED SAND-DUNES—A NATIONAL PARK OPPORTUNITY

BY ORPHEUS MOYER SCHANTZ

A DUNE region ordinarily signifies an inhospitable, wind-swept tract of country, barren of vegetation and sparsely inhabited by animal life. The term "sand-dune" long ago denoted a land to be avoided by travelers whenever possible. Lack of water, intense heat, and the ever-drifting sand itself were sufficient causes for shunning any dune country as a highway. Charles Kingsley, in Westward Ho, says: "The Spaniards neared and neared the fatal dunes that fringed the shore for many a weary mile."



Photograph by Frances La Follette

A POPLAR WHICH CONVERTS ITS BRANCHES INTO ROOTS AND ITS ROOTS INTO BRANCHES, AS THE WIND BLOWS

At one time this tree of the Indiana sand-dunes was buried up to the dark line. The limbs then did duty as roots, but now that it is being uncovered they are again performing their normal function as limbs.

The dunes of the Atlantic coast, driven inland by the terrific storms off the ocean, at times have devastated large areas of fertile land, relentlessly destroying all vegetation, and the dune regions of interior America were the bane of early pioneers.

At the head of Lake Michigan, including the entire shoreline of Indiana and parts of the adjoining shores of Illinois and Michigan, there is a dune country unique and wonderful and entirely different from our usual ideas of sand-dunes.

The vegetation of the average desert or sandy region is usually an interesting example of the survival of the fittest. and most of the plant families remaining have adapted themselves to the severe

Photograph by J. R. Daniels

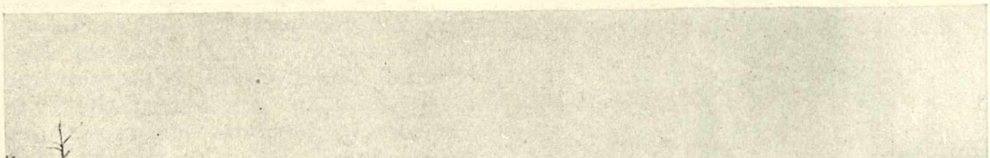
A FIND FOR THE ORNITHOLOGIST

He sits and blinks the day away amid trees and shrubs of bewildering beauty growing on the shores of a fresh-water sea.

Photograph by H. Mertsky

THE OUTLINES OF THE DUNES ARE ALWAYS GRACEFUL

Their size is indicated by comparison with the human figure. The lake appears in the distance.



Photograph by Alfred L. Fitch

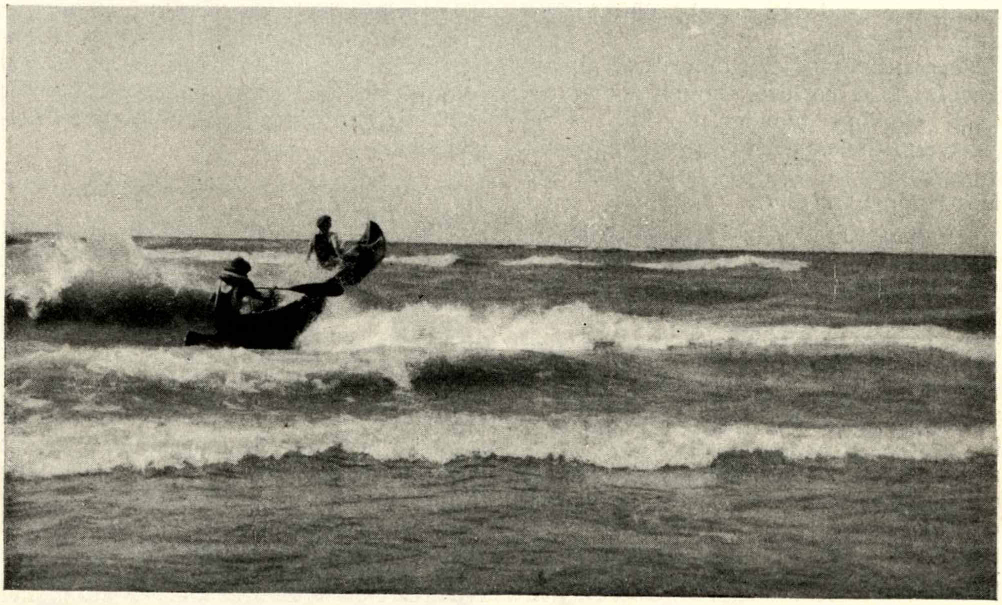
UP HILL AND DOWN DALE IN INDIANA'S COMBINATION DESERT AND OASIS

The verdure-clad billows of sand constitute a veritable botanical garden, which is a paradise for birds and plants of many species.

Photograph by H. Mertsky

AMONG THE LUPINES IN THE SAND-DUNES

Great masses of bird's-foot and other violets, lupines, phlox of different colors, trilliums, waxy bells of wintergreen and blueberry, hepaticas, trailing arbutus—not just a few flowers, but acres of them and miles of acres—make a natural flower garden which cannot be duplicated artificially.



Photograph by L. T. Gable

WHERE THE WAVES BREAK UPON THE DUNES OF INDIANA

Canoeing here resembles the exhilarating sport of surf-board riding in the Hawaiian Islands.

Photograph by Arthur E. Anderson

THE TOPOGRAPHY OF THE DUNES LENDS ITSELF TO THE FORMATION OF MARVELOUS PLANT SOCIETIES

this wonderland of sandy beach and forested lake shore.

The outlines of the dunes are always graceful; for Nature, though sometimes cruel, displays wonderful skill as an artist, and the exposed wind-carved sands are arranged in beautiful curves and outlines against the sky.

The topography of the dunes lends itself to the formation of marvelous plant societies: great shallow ponds, with their typical borders of marsh-loving plants; deep, sheltered hollows, perfectly dry at the bottom; active stream beds, thickly fringed with willows, alders, and buttonbush, with thickets of giant mallows on the mucky shores; north slopes, with trailing arbutus, wintergreen, partridge berry, hepaticas, and violets, and rare ferns and orchids spread in artistic profusion; moving dunes, whose leeward sides extend slowly and surely south, in time covering even tall trees, with their smothering blanket of sand; old dunes, clothed to their crests with vegetation, and at intervals "blow-outs," where reverse winds have uncovered ghostly tree trunks, gray and weather-beaten and entirely denuded of bark, but the wood still sound and perfectly preserved by the sand shroud with which it was surrounded.

PLANT LIFE OF MARVELOUS VARIETY

Many trees adapt themselves to the severe conditions on the more exposed dunes, frequently sending out roots from the trunk to take advantage of the encroaching sand, and if again uncovered the roots immediately function as branches. This is particularly true of the cottonwood, which also sends out roots of remarkable length close to the surface of the sand, in this way making use of surface moisture (see page 430).

Trees, shrubs, and many plants from the far north grow side by side with others whose natural habitat is many miles south of the lake, and the plant life is bewildering to the uninitiated and a joy to the botanist. The combination of underlying sand and humus, with abun-

Photograph by Frances La Follette

SAND-DUNE WOODLANDS IN WINTER

Each succeeding season among the dunes brings its pictures of natural beauties and scenic charms.

dant moisture, makes a condition of soil that is ideal, and the result is a luxuriant plant growth that is almost tropical.

The dune-floor vegetation is more striking than the arborescent growth, and the wealth of herbaceous plant life is remarkable. Even on the exposed lake beach and on newly formed sand drifts pioneer plants are constantly springing up. Hardy grasses, sea rockets, artemisias, sand cherries, and many others take advantage of the slightest opportunity, and around these plants embryo dunes form, which in time grow and join the ever-changing and fascinating panorama of dune succession.

As soon as a slight covering of humus accumulates, possession is taken by the stronger plant growth, and bearberry, juniper, arrow woods, and sumacs soon fill up the vacant spaces, preparing the way for the tree growth that is waiting its turn.

The black oak is the most conspicuous tree of the older dunes, but it is accompanied by many others, mostly deciduous, although there are a few evergreens and one other conifer—the tamarack.

Basswood, poplars, tulip, sassafras, juneberry, flowering dogwood, white and gray pines, and occasionally white oaks, are all to be found in the drier parts of the dunes; and in the lower lands sour gum, red maple, swamp white oak, pawpaw, cherry, and the larger sumacs grow luxuriantly in the peaty soil.

A NEW GREEN FOR EVERY SEASON

Each season in the dunes has its own individual attraction. In springtime the dark greens of pines and junipers make a fitting background for the delicate shades of the opening foliage of the deciduous trees, with their soft greens, pinks, and reds. Great splashes of white blossoms of shad bush, cherry, plum, and viburnums; the striking blossoms of flowering dogwood and button bush; masses of red maple pendants and the delicate coloring of the oaks make a strong appeal to the esthetic sense of the lover of Nature.

Over all the taller growth are scattered draperies of vines, softening the rigid outlines and adding their blossoms to the marvelous display.

The herbaceous plant life is even more varied and wonderful. Great masses of bird's-foot and other violets, lupines, phlox of different colors, trilliums, waxy bells of wintergreen and blueberry, hepaticas, trailing arbutus—not just a few flowers, but acres of them and miles of acres—make a natural paradise which cannot be artificially duplicated (see page 434).

The marshes have their own individuality of sedges, cat tails, reeds, and borders of the larger ferns—royal, cinnamon, and interrupted. The Virginia chain fern in one of the drier marshes crowds out the less vigorous plant life, coloring with its fertile fronds great stretches of the marsh a beautiful sepia. The blending of browns and greens in the marshes softens the landscape to an exquisite symphony of color in pleasing contrast to the more vivid coloring of the higher land adjoining.

AUTUMN'S FLAMING DUNE LANDSCAPE

It is in autumn, however, that the dune coloration is at its best, for then the entire region becomes a flaming landscape of gorgeous reds and yellows. Nature goes into her winter rest with a last effort in color that is beyond adequate description. The sour gum, red maple, sumacs, and sassafras discard their modesty and vie with each other in a gorgeous riot of autumn coloring. The foliage of the black oak, as it changes, combines red, green, and bronze, and covers the ridges with a garment of beauty.

Photograph by Frances La Follette

THIS IS A SAND-DUNE COVERED WITH SNOW

The dune country, easily accessible to 10,000,000 Americans, has its special lure for every month of the year.

Many of the trees and lesser shrubs and other plants bear edible fruits, providing a sumptuous larder for hosts of birds and small animals. The bird life of the region surrounding the end of Lake Michigan is very abundant, and during migrations nowhere in the United States are there more varieties of both land and shore birds to be seen than here.

Conditions of food, shelter, and climate are particularly favorable for these visitors. Although the game birds are sadly persecuted, they still visit the dunes in great numbers each year, scarcely a season passing without having among its records some rare migratory visitor or new nesting record.

The ruffed grouse, golden eagle, horned owl, and the great blue heron still visit the dunes, and in winter-time the evening grosbeak, crossbills, and pine finches are attracted by the wealth of food.

Geologically, the dunes and distinctly traceable old shorelines tell the fascinating story of the Glacial period antedating Lake Michigan. The near-by universities bring their classes to the dunes

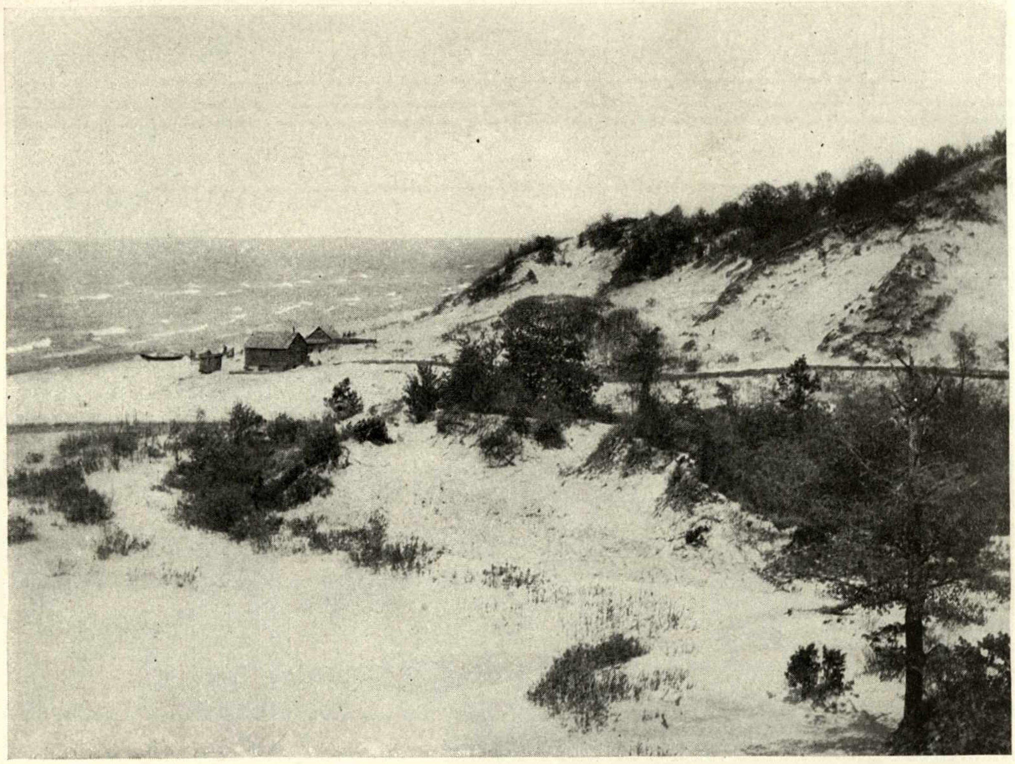
Photograph by Arthur E. Anderson

AT THE HEAD OF LAKE MICHIGAN THERE IS A DUNE COUNTRY UNIQUE AND WONDERFUL

It includes the entire shoreline of Indiana and parts of the adjoining shores of Illinois and Michigan.

Photograph by A. E. Ormes

A WINTER LANDSCAPE IN THE DUNES



Photograph by Irwin S. Rosenfels

THE INDIANA SAND-DUNES AND LAKE MICHIGAN SHORE

conditions of their environment. Desert plants, too, are often strikingly beautiful when in blossom; but their period of growth and luxury is very short, lasting only through the rainy season.

A SEA OF SAND, BUT NO DESERT DROUGHT

Conditions are reversed in the Indiana dunes, for here there is never a long period of drought, and in place of a desert area there is a natural propagating garden, where a most astonishing number of rare and beautiful plants congregate, having migrated both from the north and south to this unusually favored locality (see pages 434-435).

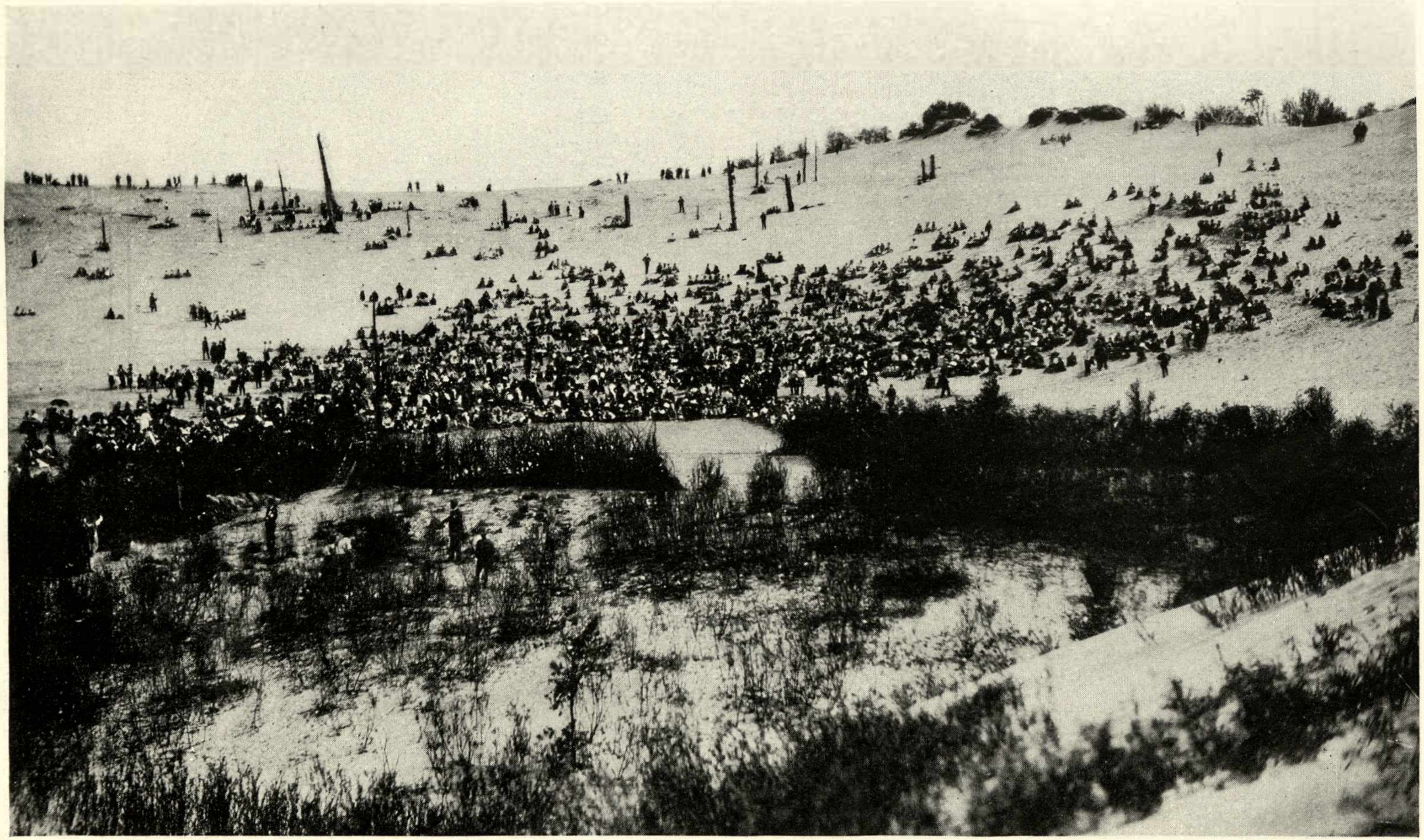
Here, on the shores of a great fresh-water sea, whose moisture is constantly being carried southward by the prevailing northwest winds, and tempered both in summer and winter by its position on the lake, is a region so wonderful that it should be kept for all time as a great natural park for study and the recreation of millions of people of the Middle West.

There are about 20 miles of shoreline, averaging a mile or more in width and containing approximately 30 square miles of land in the dunes, still unspoiled by commercial industries. This region is situated within easy reach of more than 10,000,000 people at a nominal cost for transportation.

A visit to almost any one of the national parks is a luxury beyond the reach of the majority of the people of the Middle West; but the Lake Michigan dune region can be visited at all seasons and at a cost of, at the most, a few dollars. The dunes are popular even in mid-winter, and many a party of students and other outdoor enthusiasts has enjoyed the scenery and the bracing air of the lake at that time of year (see pages 437, 440).

MANY CHARMS FOR MANY MEN

The attractions of the dunes are so varied that all classes may here find recreation suited to their wishes. The tramper, the geologist, the botanist, the zoölogist, the student of early American history, and those who seek only fresh air and clear skies, can find all they desire, and more than they hoped for, in



Photograph by H. P. Cook

THE SCENE OF A PAGEANT PORTRAYING THE EARLY HISTORY OF THE INDIANA SAND-DUNES

This pictorial presentation of the events which made this region a part of the American Union was fittingly staged in a natural amphitheater formed by the dunes themselves. It was through the dune country that the French pioneers found their way from Detroit to the site of Chicago.

Photograph by Irwin S. Rosenfels

DOWN MOUNT TOM: INDIANA SAND-DUNES

as a most necessary object-lesson of their natural-science courses.

HISTORIC ASSOCIATIONS IN THE DUNE COUNTRY

Historically, also, the dunes have their place in the earlier history of the West. The old Indian trails can still be pointed out, and it was through the dunes that the pioneer French found their way from Detroit to the site of Chicago, at the mouth of the Chicago River.

Nature organizations of Chicago and Indiana have done much to bring the dunes to the attention of thousands of people who never before knew them except superficially from the railroad or trolley line, and each year they are becoming better known and appreciated.

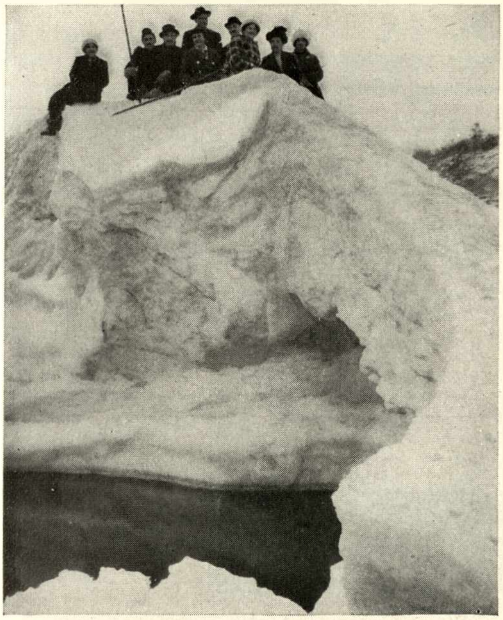
As a result of this education the residents of the adjacent country are beginning to realize that they have a truly remarkable forest area within a few hours' ride; that miles of beautiful beaches are free to the tired city dweller, and that here they can go out in the pure air and see the sun rise and set over the lake, without a sign of skyscraper or factory visible anywhere.

The consideration of the dunes as a national park has received the serious attention of Congress to the extent that in 1916 a public hearing was held in Chicago to gather data in connection with the proposed project. At this hearing hundreds of men and women of prominence gave evidence as to its advantages.

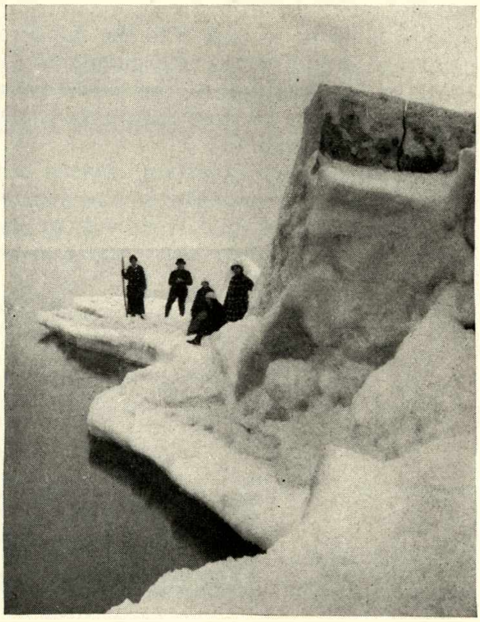
In the spring of 1917 a pageant was given in a great natural amphitheater in the dunes, which vividly portrayed the early history of the dunes, illustrating with striking exactness the stirring events which made it American.

SHALL THEY BE PRESERVED?

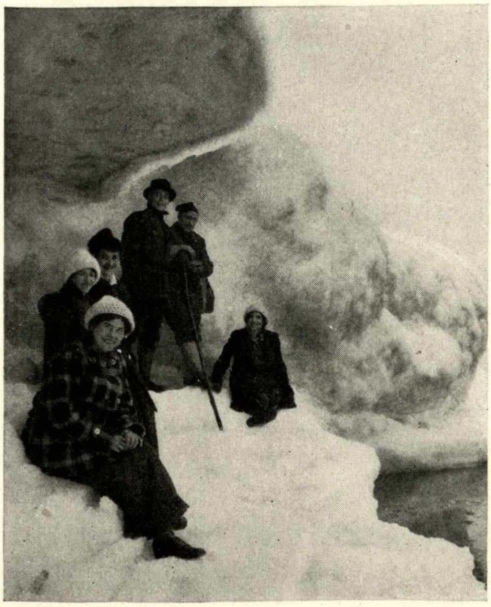
The interest of the public in the dunes has been materially advanced by the public hearing and the great pageant, and a new epoch has been reached in the campaign for their preservation. If this re-



WHEN ARCHITECT WINTER BUILDS AMONG THE SANDS



YOU MIGHT BE WITH PEARY, BUT IT IS ONLY THE DUNES



IN THE "HIGH ALPS" OF THE DUNES

AN ICE BRIDGE ALONG THE DUNES

The snow king converts the southern shores of Lake Michigan into the semblance of Greenland's icy mountains. Photographs by C. G. Dudley.

gion is allowed to pass into the hands of commercial industries, the people of the State of Indiana and of the entire country will lose for all time their free access to Lake Michigan.

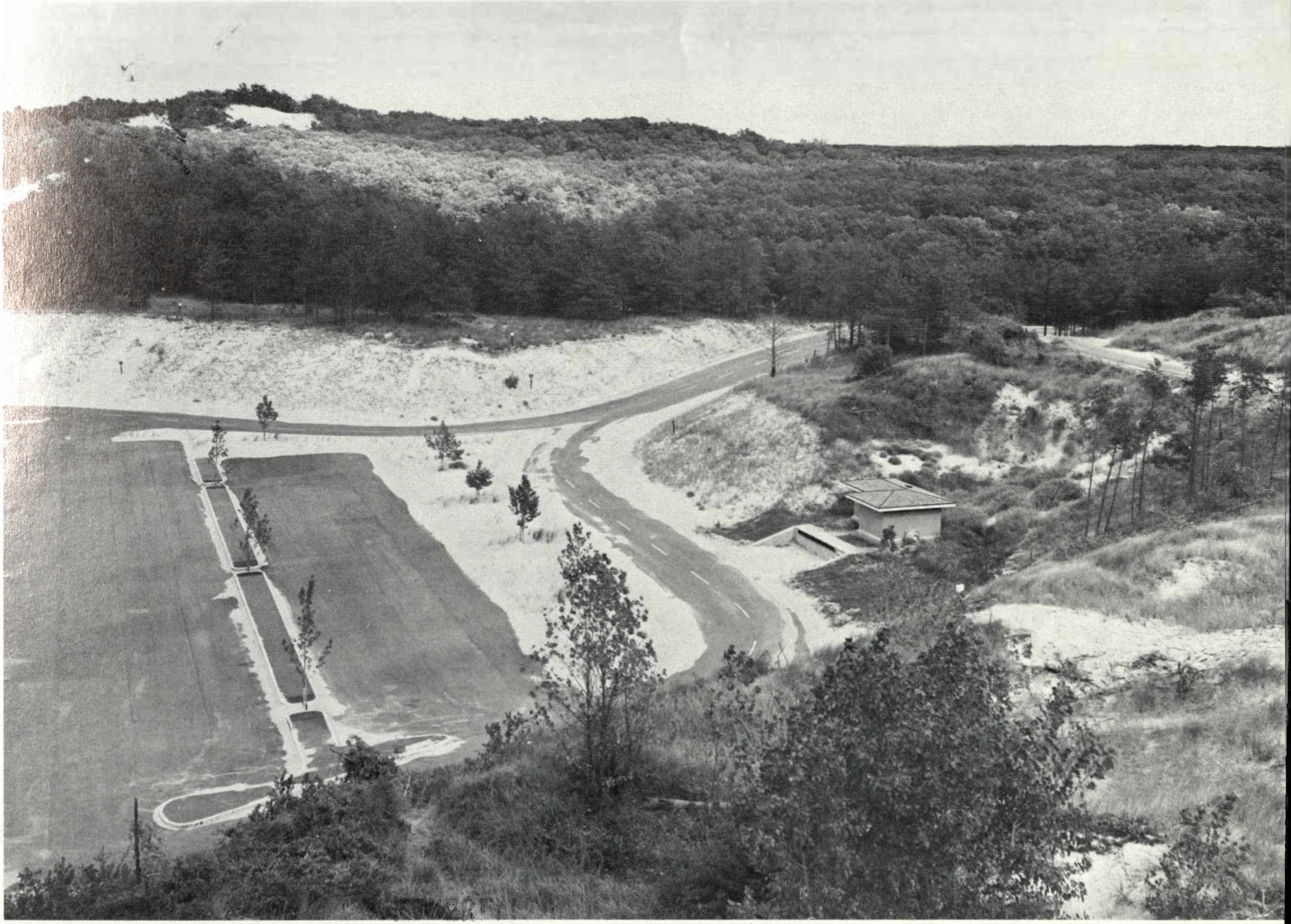
The importance of prompt action cannot be urged too strongly, as the demand for large tracts of land with railway and water facilities would soon result in the destruction of the natural advantages of this remnant of scenic beauty and fascinating forest and plant life.

Under commercial occupancy the growth of centuries could be destroyed in a short time. It would be a catastrophe if this opportunity for preserving an incomparable breathing spot on Lake Michigan should be neglected.

Outdoor Indiana
July - August 1977

State Parks (Ind)

Back from the Long White Beach Are the Dunes and Their Flora



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The famous three-mile stretch of singing sands on the Lake Michigan shore at Indiana Dunes State Park affords a rare recreation opportunity to thousands of visitors who come throughout our warmer months. But away from the water is an even more unusual year-around wonderland of trees and vegetation.

At Dunes State Park the extremities of the differing habitats of both North and South meet in a sort of Nature's relay race. This area is protected as a State Nature Preserve with only pedestrian traffic permitted.

You can see things at The Dunes which are not found elsewhere in Indiana. The next time you visit this famous Park, take along hiking shoes and cameras as well as swim wear.

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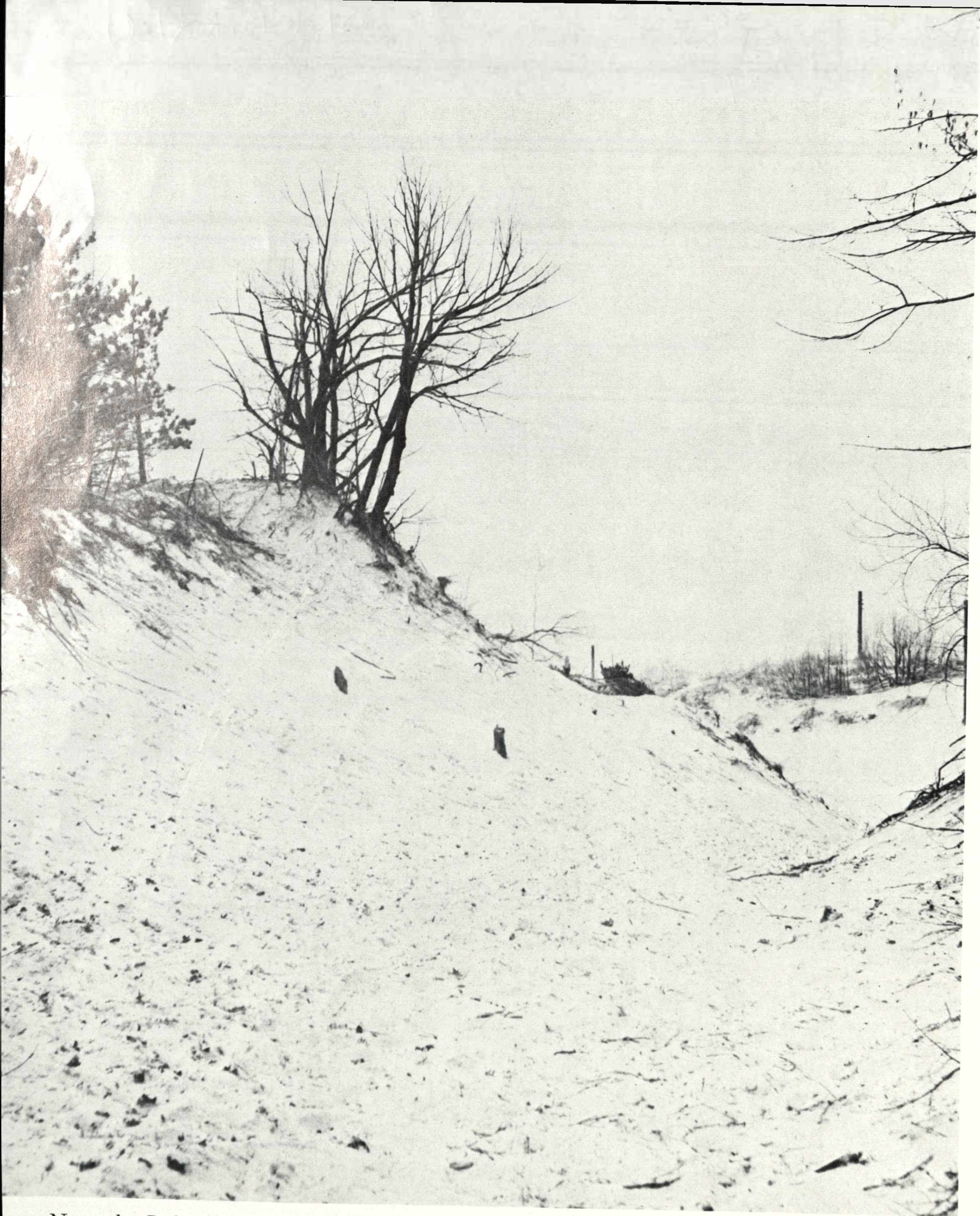
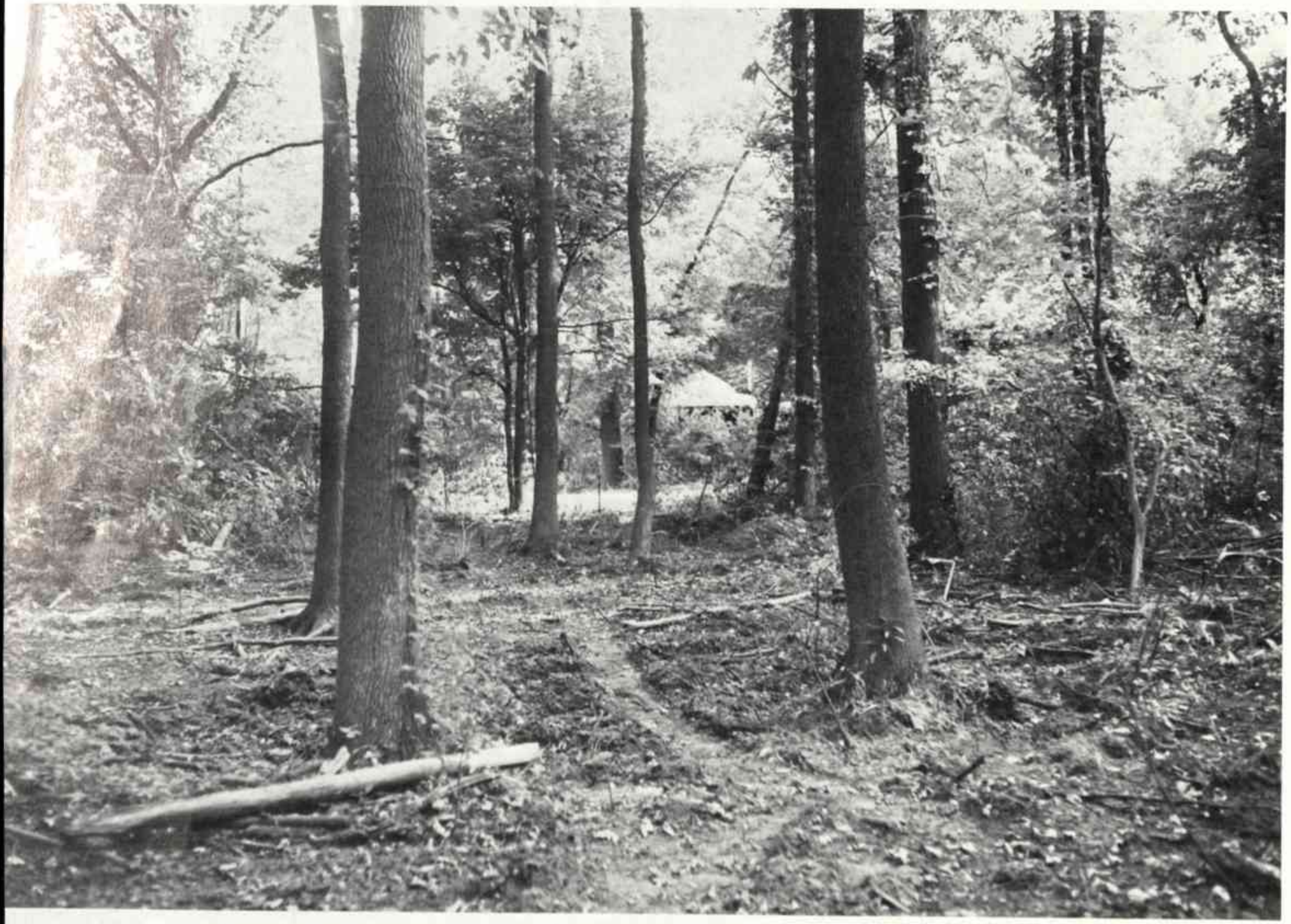


Near the Lake the Ageless Struggle Continues Between the Trees, the Sands, the Winds and the Water.

But Away from the Shore There Are the Robust Rare Flora Which Make Dunes State Park Unique.



The Forest Floor Is Ever-Changing. But in the Nature Preserve It Is Protected Except for Foot Paths. At Dunes State Park All the Senses Get Full Play.